

## Episode 16: Actuarial science and normal distributions

### **Puzzle:**

Your factory packages crisps into bags using a machine which isn't completely accurate and the weight of crisps which ends up in each bag varies according to a normal distribution.

The mean weight of a bag is 154g, and the standard deviation is 8g. The bags are labelled as containing 150g of crisps, but 31% of bags produced by the machine are underweight. To what value should you change your mean weight to make sure 95% of bags weigh more than 150g?

### **Solution**

On a normal distribution curve, 95% of values will fall within two standard deviations of the mean. This means in order to ensure 95% of crisp packets weigh 150g or more, we need 150g to be two standard deviations away from the mean - so the mean needs to be  $150\text{g} + (2 \times 8\text{g}) = 166\text{g}$ .